Minors Offered by the Mellon College of Science

The Mellon College of Science offers several minors to students interested in broadening their scientific training or acquiring a level of expertise in a particular scientific field. The intercollege minors described below are designed to supplement your degree in science; the departmental minors offer you a means of exploring another field and are open to students throughout the university.

Intercollege Minors
Please see the descriptions below.
- Environmental Science
- Health Care Policy and Management
- Scientific Computing

Departmental Minors in the Mellon College of Science
For descriptions, please see the departmental sections which follow.
- Biological Sciences
- Chemistry
- Computational Finance
- Discrete Mathematics and Logic
- Mathematical Sciences
- Neuroscience
- Physics

Minor in Environmental and Sustainability Studies
Program Director: Maggie Braun, MCS Dean's Office
Faculty Advisor: Abigail Owen, History Department
This new minor replaces the earlier minors in Environmental Science (MCS), Environmental Studies (Dietrich), and Environmental Engineering & Sustainability (Engineering).

Required Courses:
One Course in Chemistry
Choose one
- 09-105 Introduction to Modern Chemistry I Units 10
- 09-107 Honors Chemistry: Fundamentals, Concepts and Applications (for students enrolled in MCS, Engineering, or SCS) Units 10
- 09-103 Atoms, Molecules and Chemical Change (for students enrolled in CFA, Tepper, or Dietrich) Units 9

Interdisciplinary Course
- 99-236 Introduction to Environmental Ideas Units 9

One Course in Statistics & Data Science (CFA Students only)
Choose one
- 36-200 Reasoning with Data Units 9
  Students entering CMU prior to 2018 may substitute 36-201 for 36-200.

Electives (36 Units)
Appropriate electives chosen in consultation with the Faculty Advisor.

Total Number of Required Units 54

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Faculty Advisors:
- Jason D'Antonio, Mellon College of Science
- James F. Jordan, H. John Heinz III College

The face of health care is changing. The practice of medicine is being fundamentally altered by the forces of change in public policy, health care organizations and in the industry as a whole. The role of individual professionals in this industry is changing as rapidly as the industry itself. Traditional career paths have disappeared overnight to be replaced by new opportunities that require new skills. New organizations are placing new demands on their professional and medical staffs. The criteria of efficiency and financial stability are entering the domains of diagnosis and treatment.

This minor is designed to provide students considering a career in the health professions with an understanding of how these changes are likely to affect their careers. Students will become familiar with the critical policy and management issues and will begin to learn to operate effectively in the emerging health care environment. The curriculum combines economic, organizational, managerial, historical and psychological perspectives on these issues to provide a foundation for a deepened understanding of the changing structure of health care organizations and policy.

Required Courses for HCPM Minor (45 Unit minimum)
A total of 69 units are required to complete this minor. Entry into the minor requires completion of 73-102 Principles of Microeconomics and 88-221 Analytical Foundations of Public Policy or the equivalent by approval.

Required Courses
Students are required to take the following courses.
- 79-330 Medicine and Society Units 9
- 94-705 Health Economics Units 12
- 90-836 Health Policy and Management Systems Units 6

Elective Courses 24 units
Complete a minimum of 24 units.
- 90-721 Healthcare Management Units 6
- 90-818 Health Care Quality & Performance Improvement Units 6
- 90-723 Financial Statements and Analysis of Companies Units 6
- 90-831 Advanced Financial Management of Health Care Units 6
- 94-706 Healthcare Information Systems Units 12
- 90-832 Health Law Units 6

Electives
- 76-494 Healthcare Communications Units 9
- 79-318 Sustainable Social Change: History and Practice Units 9
- 80-245 Medical Ethics Units 9
- 85-241 Social Psychology Units 9
- 85-442 Health Psychology Units 9
- 85-446 Psychology of Gender Units 9

Please note that some of these courses have prerequisites that will not count toward the completion of the requirements for this minor.

Minor in Scientific Computing
Advisor: Dr. Maggie Braun
Sometimes called “computational science,” scientific computing is the application of high-performance computers and modern computational technologies to problems in the sciences and engineering. Research in this area is inherently multidisciplinary, requiring strong ties with a scientific discipline.

MCS students can easily build on their scientific training with this applied computational program. The curriculum consists of five areas of concentration, which span the natural sciences, mathematics, programming, and research. The curriculum is structured to allow flexibility in choosing courses that meet students' particular interests or best compliment their major. The minor is also a natural choice for students majoring in any technical area.
Required Courses

Students must meet the requirements of the following categories:

A. Non-Introductory Science Requirement (9-12 units)
Complete 1 course from Biological Sciences, Chemistry, or Physics at the 200 level or higher, excluding those courses listed below as part of the requirements of the minor. Courses with a significant science component from other colleges may be substituted with approval from the minor advisor.

B. Computational Science Requirement (18-24 units)
Complete 2 of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>03-250</td>
<td>Introduction to Computational Biology</td>
<td>12</td>
</tr>
<tr>
<td>03-511</td>
<td>Computational Molecular Biology and Genomics</td>
<td>9</td>
</tr>
<tr>
<td>09-560</td>
<td>Computational Chemistry</td>
<td>12</td>
</tr>
<tr>
<td>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>33-241</td>
<td>Introduction to Computational Physics</td>
<td>9</td>
</tr>
</tbody>
</table>

C. Computational Methods Requirement (9 units)
Complete one of the following courses from outside of your home department.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-320</td>
<td>Symbolic Programming Methods</td>
<td>9</td>
</tr>
<tr>
<td>21-369</td>
<td>Numerical Methods</td>
<td>12</td>
</tr>
<tr>
<td>33-232</td>
<td>Mathematical Methods of Physics</td>
<td>10</td>
</tr>
<tr>
<td>33-456</td>
<td>Advanced Computational Physics</td>
<td>9</td>
</tr>
<tr>
<td>36-410</td>
<td>Introduction to Probability Modeling</td>
<td>9</td>
</tr>
</tbody>
</table>

D. Applied Scientific Computing Research Project(s) (9 units)
Complete one approved research project in an area of applied scientific computing. In some cases, this research could be replaced with 9 units of an approved project-based course in advanced scientific computing. The administrator of the minor will maintain a list of appropriate courses. Under special circumstances summer research may count toward this requirement, although it cannot be counted toward the units required for graduation.

E. Complete any additional course from category C or D (9 units)